



The GEO Biodiversity Observation Network

GEO BON is contributing to the Global Earth Observation System of Systems

Responses to the GEO BON questionnaire

Version 1 (12 Mars 2008)



Introduction

In December 2007, the interim steering group of GEO BON began sending out a questionnaire to relevant parties that contained the following questions:

- 1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

- 2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but are, for example, regional or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

- 3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g., how could it address your needs, how could it strengthen your position, etc.?

- 4) Please feel free to add any further comments or thoughts you would like to make.

So far, we received 24 responses, from a wide-ranging group of organizations and individuals. We decided to present these responses in an unedited but anonymous way, because we did not ask for permission to give out contact details. We hope this arrangement finds the consent of the respondents.

Further responses to the questionnaire are most welcome, please send to bruno@diversitas-international.org



Respondent 1

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

To me will be easy access to information that are proxy indicators of biodiversity, for example NDVI, EVI. In addition, access to tools that can be used on inverse modeling approaches to estimate species richness, composition, level of successional stage of forest that can then be linked to species richness will be of great use. I think that also access to EO-1 hyperspectral sites at no charge for sites that can be considered "mega research sites" (a place with lots of information that people can use to test tools) will be of great value.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

We are working on a Facebook type initiative denominated GeoChronos (See proposal attached) that it is aimed to facilitate the work that we do in tropical dry forests. This initiative could be of great potential as a tool for distribution and networking. Please keep it confidential (you can pass it along to people like Norbert, Woody, Douglas and Neville, but not further). The first phase of this initiative is under implementation and it is aimed to bring the role of MODIS products on monitoring and validation of biodiversity models in tropical dry forests.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

I think that the aggregated value is considerable to our organization and we are kind to be a key part of it. We currently host a latin american network of +50s scientists and graduate students of which earth observations of biodiversity are key, therefore our intention of playing a key role on this initiative is of great importance to us a University Center (<http://ceos.ualberta.ca>) and then as International Collaborative Research Network (<http://tropi-dry.eas.ualberta.ca>)

Respondent 2

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

- Access to free optical and radar high - moderate resolution satellite imagery (<100m resolution)
- Access to global databases for meteorologic data, species locality data, land use, and geocoded ground photos with the capability to allow citizen scientists to contribute and download data
- Open source software tools and "standardized" methods for processing, analyzing, and displaying data distributed by the network
- Training opportunities to teach/learn how to benefit from the resources distributed by the network.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

- Development of open source geospatial software solutions. Software developed through our lab is distributed with open source software licenses.
- Training in the use of geospatial techniques (remote sensing, GIS, GPS...). We provide geospatial training to the conservation community and are working on developing distance learning capabilities to maximize our reach.
- Online database of geocoded ground photos and a community of scientists and non-scientist to contribute content from around the world to the database. This is a project under development in our lab.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

The most effective way the network can strengthen my organization is to foster a community that is willing to use open resources (use of open content licensing, and open source software) so that knowledge and processing capabilities are accessible to the masses and it can advance quickly. This would benefit us by ensuring access to the resources we need to contribute to and benefit from the resources supported by the network.

Respondent 3

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

Probably reference data related to the BDM-Data.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

See: <http://www.biodiversitymonitoring.ch/english/aktuell/portal.php>

During 2008 we intend to publish all our methods / field manuals on our website

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

From our experience - we maintain international contacts within BDM since ca 1996 - the benefit will be very limited concerning methods or tools. We had to learn that there is not much interest (or little scope?) for adjusting programs.

Data on a global level or from other regions might be interesting als reference data

Respondent 4

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

SAHFOS' Continuous Plankton Recorder Survey is recognised as an ocean observation platform for marine biodiversity by IOC and by GOOS. We currently operate at regional/ocean basin scale (N Atlantic, N Pacific etc). The next step is to use the CPR (as a tool) to extend from basin scale to global scale

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

SAHFOS produces Ecological Status Reports and these are used by IPCC to assess climate impact on ocean biodiversity. European policy makers use our report for strategic planning

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

The ocean's response to change is a global issue. So far we have fragmented picture as we work at the regional scale. Addressing a global problem requires a global perspective

Respondent 5

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

Accurate, quantitative, spatially explicit assessments of land cover and / or biodiversity change at increasingly fine scales.

Composite and decomposable indices of change in biodiversity and land cover that can be split and amalgamated temporally, spatially and taxonomically.

Accurate and refined species range and distribution maps that are suitable for use in conjunction with other monitoring information.

Support for on going initiatives that could potentially contribute to this project.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

Site records and polygons – Species records, Important Bird Area locations, Nature reserves locations.

Policy and advocacy experience to use the information effectively.

Through BirdLife Partnership: IBA boundaries, EBA boundaries, Links to global bird information networks, links to IUCN, links to CBD, species range maps.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

Adding accurate scientific information, strengthening the credibility of bird conservation work, including effective monitoring and advocacy, as well as targeting management and action on the ground in the field.

Respondent 6

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

Analysis of biodiversity value (species, habitats) by region, country, protected area Land-cover changes around protected areas Distribution maps by species / family for animal and vegetal species.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

Land-cover change analysis around main protected areas in Africa (currently 15, in the future 50)
Phenology data over Africa (updated every 10 days, at 1 km spatial resolution) Analysis of biodiversity value and threats around 741 PAs in Africa. (<http://www.tem.jrc.it/PA/index.html>)

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

Integrate our scientific analysis with other databases with a well-iestablished mandate on this matter.
Link with operational decision-makers

Respondent 7

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

- A common, up-to-date catalogue of available data (both on biodiversity and relevant environmental parameters) from other research institutes/organizations, and tools to get access to these data, e.g. GUI support for selecting data for downloading, contact persons, etc.
- Access to actual, high-quality remote sensing data.
- Digests of global biodiversity trends and patterns, with graphs and examples for easy (copy-paste) inclusion in presentations.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

- IEB has an actual geodatabase of the natural and semi-natural vegetation of Hungary, of which IEB can provide regional scale maps, habitat quality/naturalness analyses and natural capital indices.
- IEB is the coordinator of the LTER Kiskun-site. Questions studied here, information about which can be provided by IEB, include:
 - *Relationships of plant productivity and biodiversity on the landscape level*
 - *Changes in the organization and dynamics of the sand vegetation along an ecological gradient*
 - *Invasion of alien plants in the sand vegetation*
 - *The role of disturbances in sand grassland dynamics*
 - *The effects of extreme droughts on sand grassland*
 - *Effects of climate change on the dynamics of insects*
 - *Restoration of native sandy grasslands*
- Data on biodiversity trends are available for smaller sample areas, scattered mainly in the central and eastern lowlands of the country (Danube-Tisza Interfluve).
- IEB is the coordinator of the Hungarian Forest Reserve Program. Information on natural processes of freely developing old-growth forests, primarily serving as reference, as well as on forest biodiversity and natural dynamics can be provided.
- The Hungarian Danube Research Institute forms a department of IEB. Historical, as well as actual information on the benthic, planktonic, and nekton organisms of the Danube can be provided by HDRI, with specific emphasis on :
 - *Studies of hydrobiological status, eutrophication, macroinvertebrate biodiversity, fish populations, and long-term changes of the different sections of the Danube, and their floodplains*
 - *Theoretical and methodological applicability of macrofauna for monitoring great rivers.*
 - *Hydrobiological investigation of small standing and running water bodies in different protected areas*
 - *Comprehensive limnological investigation of the special water bodies of Lake Fertô, characteristic of that part of the lake on Hungarian territory, in order to establish the strategy for its protection*

- Examples of our users:
 - *National Park Directorates use our maps and derived data on the historical and present distribution of habitat types for every-day practical nature conservation, as well as long-term planning of conservation actions*
 - *Our results and data were used for compiling the first Natura 2000 assessment*
 - *Our results are intensively used in environmental awareness and education campaigns*

3) *Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?*

- IEB is the main biodiversity research institute in the Pannonian biogeographic region. The partnership provided by a GEO BON would improve the institute's visibility, which would facilitate contacting IEB in questions related to the biota of the Pannonian region.
- Being partner to a global initiative would improve the political negotiation position of the institute.
- The partnership would build cooperation between research institutes, which would facilitate the formation of successful consortia for future calls.
- A common, up-to-date catalogue of available biodiversity data would enable IEB researchers to find comparisons for their studies and/or to extend the spatial range of their analyses.
- Up-to-date, high-quality remote sensing data would greatly help continue and update the nation-wide surveying of our natural heritage, and design further long-term ecological studies.
- Digested information on global biodiversity trends, with explicit examples (especially examples which show how interventions could reverse biodiversity loss) would greatly help in conversations with policy makers and other stakeholders.

4) *Please feel free to add any further comments or thoughts you would like to make.*

ILTER is a very successful initiative to provide comparable information from various parts of the globe, due to addressing common question with common standards. Without specific questions, and related data collection standards and protocols the utility of joint databases is highly doubtful.

An important concern in our view is the data ownership and access rights to data of others. Because scientometry is the current practice for the evaluation of research institutes and researchers, sharing primary, raw data with others prior to publishing results carries significant disadvantages. On the other hand, ecological studies require extended timescales to provide significant results, which means that if data is only made available after publishing the primary results of the studies, a common database can never be up-to-date.

Respondent 8

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

We see such a network being able to use its remote sensing network to provide regular and consistent ground truthed data on habitat extent (including sea ice coverage and snow) and quality (fragmentation, diseased forest extent, etc.).

We would also benefit from developed data management tools and a web-based data portal where we could contribute our data and analyses into this global network. This would require careful consideration of data and metadata standards among other things.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

We are tracking status and trends in Arctic biodiversity using 6 indices and 13 indicators (still under development). This information will be hierarchically depicted allowing for circumpolar, national and regional perspectives. We are also developing a web-based data portal that will synthesize disparate and distributed data sources in real time to generate complex analyses, predictive models, etc and correlate this biodiversity data with a-biotic data (ie. Sea surface temperatures, etc.).

Our users are broad, ranging from the public to scientists to decision makers. The suite of indicators and indices are being developed in a way that will allow a user to drill down into the data, if desired, offering increasingly complex analyses and integration. The web portal will be the main engine that depicts and integrates information from our indicators and indices.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

The most important thing that it can offer the Circumpolar Biodiversity Monitoring Program is a wider perspective (global trends) to put into context and help gain better understanding of the trends being seen in the Arctic. This would help facilitate a greater understanding of regional vs. global phenomena and illuminate the potential mechanisms driving trends.

It would also provide an ‘uplink’ to our program allowing us to both draw from and contribute to a global observation network.

Respondent 9

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

I think the most useful products will be map based and searchable. I could envision different layers on Google earth or something like that. There are so many data products that could be integrated from satellites to gene sequences. The real key is access and visualization.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

I might be biased because it is my own work, but people seem to be interested in the objectively derived biomes from satellite platforms

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

My needs really are visualization and access. The interface must be intuitive. The more intuitive it is (less web forms) the more widely used and supported it will be.

Respondent 10

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

MODIS and IRS AWiFS data seem ideal for global level use. GLCN LCCS could provide a globally tested land cover classification and interpretation system. Global Ecological Zone or Eco-Region Maps provide a basis for producing extent of forest and land cover by ecological zone. FAO Forest Resources Assessment 1990 and Global Forest Resources Assessment 2005 provide a reasonably good example of methodology and results at the global level.

The global data products and outputs need to be linked with national and local level data products for planning and implementation of conservation measures. For such purposes, LANDSAT TM and Indian Remote Sensing satellite data (IRS LISSIII) could serve as well-tested data sources.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

In India, we are working with IRS LISSIII data at national level and developing applications of IRS AWiFS data at global level for biome characterization and vegetation type classification. FAO and ISRO plan to co-operate, along with member countries, in the use of IRS AWiFS data in Hindukush Himalayas and in Mekong Basin, to undertake land cover and vegetation classification using LCCS. The present reporter is Indian Coordinator of FAO-ISRO initiative, which can as well serve the needs of GEO-BON to some extent.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

Growing population and rapid economic development are posing serious threat to integrity of natural biological diversity. It is essential to undertake repetitive assessment of changes, evaluate their policy implications and help to take remedial measures. Hardly any country has developed such a capability for operational monitoring. A global initiative will help to build a strong case for conservation as is happening for climate change.

4) Please feel free to add any further comments or thoughts you would like to make.

Market forces and poverty are combining to extract maximum of short term gains from natural ecosystems, forests in particular. It will be great to develop a system of periodic national monitoring in a global framework, which can catalyze global action, the one like climate change. Existing networks established for Global Assessments should be made a part of this.



Respondent 11

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

Openly accessible, interconnected electronic databases for biodiversity research, geo-referenced biodiversity data with altitude info to link with other databases, niche-based models to predict future species occurrences.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

The above, in parts, and focused on mountains, once we start the database work and the portal at GBIF. Examples of our users will be published in a book soon, but they are not "our users", but rather users of their own mountain biodiversity databases or GBIF data on mountain biodiversity.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

It would allow to address all the scientific questions outlined in our Research Agenda on Mountain Data mining (see attached Research Agenda).

Respondent 12

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

To avoid duplication of the work of the World Conservation Monitoring Center, provide data/information on biodiversity and conservation efforts outside of protected areas.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

USAID supports partner organizations such as WWF (Conservation Science program), Conservation International (Center for Applied Biodiversity Science), The Nature Conservancy, and World Resources Institute. These organizations produce relevant tools and data and should therefore be engaged in the GEO-BON discussion.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

Most helpful would be specific, country-level data sets that include good data on trends in bio-diverse/natural areas, encroachment (extent and type), enforcement, species composition (eg, in reaction to climate change). We've had problems using some data at regional or eco-regional levels (or focus on individual species) because most of our work is at a country level. Very broad data sets that are uneven in quality such as FAO provides are not as useful.

4) Please feel free to add any further comments or thoughts you would like to make.

- Will the data collected be detailed enough and useful for on-the-ground management?
- Will the data focus on documenting habitat lost and fragmentation, or will it be able to identify lower levels of biodiversity changes?
- How will this information relate to the Millennium Ecosystem Assessment? Could it be used for such purposes?
- Could it be useful for individual countries in their reporting requirements under CBD or other conventions and for monitoring conditions in their countries?
- How will the information be used to motivate improved management?
- Will the data be used to identify threats to biodiversity and monitor changes in the level of those threats? This would be most useful in identifying needed actions, as well as generating the political will for changing practices by providing feedback.
- Several big threats to biodiversity are: extractive uses (forestry, fisheries, mining), habitat loss and degradation, invasive species, redirection in water uses (reducing wetlands, increasing pollution, etc.), climate change. Will these threats and their impacts be monitored?

Respondent 13

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

ILTER is a long-term site based global research programme on ecosystems. As a user of GEO-BON, ILTER would want access to data on the distribution and abundance of species and ecosystems so that (i) data and models from its sites could be set in their regional and global contexts; and (ii) so that locally derived models linking changes in biodiversity to pressures and effects on ecosystem services could be up-scaled more effectively.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

ILTER co-ordinates long-term ecosystem research sites and platforms in 36 countries around the globe. These sites can provide data on changes in biodiversity in relation to local and global drivers and pressures and can begin to evaluate the effects of these changes on ecosystem services. ILTER could provide many examples of where such information is used to improve environmental management at local and, to some extent, national levels.

ILTER is not yet able to provide generic models that can be linked into wider-scale models or data-sets. However, it is one of ILTER's ambitions to do this and as a step towards this it has recently started a programme to synthesise information from its sites within a socio-ecological framework that will enable us to identify the main drivers and pressures of change across our sites and their impacts on ecosystems and ecosystem services.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

Long-term observation programmes operated by ILTER are expensive and hard to maintain. They are therefore under constant threat from lack of funds. ILTER would look to GEO-BON to: (i) raise awareness amongst the research community of the potential of the ILTER sites and networks as research platforms on biodiversity; and (ii) raise awareness amongst of the policy community at national and global levels of the value of LTER sites in providing policy-relevant information on the sustainable use of resources. The second of these aims would be achieved if GEO-BON delivered some significant national and global products in which the part played by LTER sites was explicitly and prominently recognised.

ILTER would especially like GEO-BON to promote the value of LTER sites in developing countries. Such sites will not only underpin GEO-BON but also provide centres through which the next generation of biodiversity/ecosystem researchers and natural resource managers can be trained.



4) Please feel free to add any further comments or thoughts you would like to make.

The place of site based biodiversity research and observations needs to be stressed in the new GEO-BON strategy and implementation plan. But I have a feeling that it tends to get lost in the rush to produce some quick wins based on global EO coverage. I realise that if this is the case I would be very much to blame since I have been present at drafting meetings. But having missed the last day of the Geneva meeting and having got stuck in a mire of other stuff since then, I haven't really had a chance to check the current status of the plan. Hopefully it is not too late.

Respondent 14

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

- Trends in biodiversity for a representative sample of the world's ecosystems. Some combination of the Living Planet Index and the TEAM project done really well: even sampling of systems, taxa, including gradients of different disturbances, so we can infer causal relationships for changes in biodiversity.
- Linking of scales of observation, so coarse-scale observations can be validated by fine-scale data in a sample of places. This will help us use coarse data globally with more confidence.
- A very well-developed online database of observations, so researchers/other users could download what interests them, and sample the database for their own purposes. This needs to be easier, more transparent, and more standardized than anything that exists today. There are no good models, but it is long past due.
- Explicit focus on taxa or functional groups of central importance to people (i.e., those providing ecosystem services). Also explicit focus on traditionally poorly sampled taxa, especially those that also provide services (e.g., pollinating insects, non-tree plants).
- A set of standard sampling protocols, and some powerful incentive to adopt them. I'm sure there isn't enough money to buy cooperation from the network you will need, but perhaps something else? Preferred access to the whole database (either earlier or with more precision)? These standard protocols can be for field sampling of diversity, but also for remotely sensed quantification of landscape patterns, etc.
- A simple "explorer" tool for the lay person to use to explore maps and trends in the data would build public support for the project, and would achieve an education aim as well (imagine the curricula that could be designed around it). These tools shouldn't be a distraction, though, from collecting and compiling the data. That is the central public service, and BON can let others use the data in clever ways to make products.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

- Wildfinder: a global database of species presence/absence for the world's terrestrial ecoregions, including all terrestrial vertebrates. (www.worldwildlife.org/wildfinder). This has been used in several global analyses of biodiversity pattern and importance, in a variety of priority setting assessments, as well as to correct biases in other datasets (e.g., the Living Planet Index).
- An equivalent database on freshwater fishes of the world (www.feow.org). so far used for few analyses, as it has just been completed.
- Many remotely-sensed maps of habitat extent and fragmentation, including changes through time.



3) *Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?*

- At the most basic and global level, it would provide a rigorous, statistically sound way of taking the biodiversity pulse of the planet. An interesting, useful, credible “dow jones” of biodiversity could be assembled each year, from a balanced, representative set of places and species, and reported. Again, like the LPI or Red List, but much more complete.
- It would help us evaluate whether our conservation interventions are having an effect. By comparing trends in biodiversity in places NGOs work with trends in equivalent places they don’t, we can evaluate the success of our efforts, see which approaches work, which don’t, etc. This kind of rigorous evaluation is entirely lacking in conservation, and it leads to repetition of mistakes, wasted effort, etc.
- It would help WWF and other NGOs dynamically target their efforts to places in which biodiversity is trending downward most steeply. As those places change, our focus can change. This would require “real time” (at least annually) reporting and synthesis. At present we set priorities so slowly and stick with them so stubbornly that important trends (i.e., shifts in agricultural expansion pressure) go un-addressed for too long. An early warning system, really (that doesn’t really have to be that early, just current).
- Even if we stick with static priorities, the additional taxa that I assume would be part of the BON would deepen the rigor and ecological thinking behind NGO priorities. It would end the tyranny of birds (and to some extent mammals), for instance, in dominating conservation planning and priorities. Plants and invertebrates especially would be helpful.

4) *Please feel free to add any further comments or thoughts you would like to make.*

We should consider partnering with Google to design the database, and any interfaces. They are interested in projects such as this that can draw on their expertise and help the world. I have been in contact with them on a several other projects, and can approach them on this as well. Perhaps others already have contacts there too, and perhaps its too early for this. But it’s worth considering, and funding could be involved too.

Respondent 15

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

Land cover and land use areas undergoing rapid environmental change, including loss or fragmentation of ecosystem and related loss of biodiversity. Also, identification, monitoring and preparation of measures to cope with natural threats like storms, flood, drought and mass movement.

Furthermore, data from remote sensing satellites for forest assessment especially detecting forest cover change and degradation, locating forest fire and mapping new roads, settlement and logging.

Remote sensing data should also be needed by providing data for mapping areas where a forest is under stress for instance from pest infestation or drought.

However, at my local level, I can provide the following data from Nigeria.

Species diversity data and their ecological status, endangered species of conservation concern in Nigeria, Habitat-Ecosystem diversity, National parks, nature reserves, ex-situ institutions/conservation facilities.

Respondent 16

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

- Data products: forest cover maps, protected area maps, species distribution maps, ecoregion maps, meteorological maps (temperature and precipitation).
- Analyses or tools: cross-country and cross-regional statistical analysis tools; generation of biodiversity indicators for land and marine area by combining satellite based and on-the-ground validation data.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

- Currently available: species database of ASEAN region; GIS maps of protected areas of ASEAN region.
- Users: Public; protected area maps now available on the website. Targeting the ASEAN member countries to use the available and future information in support to the preparation of State of Environment and National Reports to the Convention on Biological Diversity.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

The Network should provide more organized and harmonized way to share biodiversity data and information.

In addition, the Network's function should not be limited to providing observed data and information but should also be able to link national, regional and global experts electronically; and also provide relevant and up-to-date information on global and regional projects and studies via a clearing house website.

Respondent 17

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

As ESA is mainly a provider of satellite EO data its main focus as an user of the network would be to have access to ground data bases of specific observations relevant to develop and validate global to regional EO products from space.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

ESA acquires and provides access to global data sets of satellite EO <http://eopi.esa.int/esa/esa?ts=1200048365233&cmd=dataAccess> which are relevant to monitor trends of biodiversity indicators.

Further ESA develops and provides support to user communities within the DUE program. Specifically for biodiversity issues the projects DIVERSITY (<http://www.geoville.com/diversity/>), GlobWetland (<http://www.globwetland.org/>), GlobCover (<http://dup.esrin.esa.it/projects/summary68.asp>) and Desertwatch (<http://dup.esrin.esa.it/desertwatch/project.asp>) are relevant. These projects develop and provide regional to global EO products directly supporting the implementation of the international conventions related to biodiversity such as the UNCBD, the Ramsar convention and UNCCD (see the project websites for a list of products).The users of the provided EO products range from the secretaries of the diverse conventions, international organizations (e.g. FAO, UNESCO), national ministries and NGOs.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

A global biodiversity observation network would give ESA an improved access to a broad biodiversity user community which would facilitate the understanding of needs for and the development of satellite EO products relevant for biodiversity issues.

Respondent 18

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

It might be worth looking at the recommendations from a user workshop CIESIN's Socioeconomic Data and Applications Center (SEDAC) organized in 2000 on Remote Sensing and Environmental Treaties. Although somewhat dated, we did have some parameters for a global observation network that would address the needs of CBD and Kyoto. (see pages 20-22, http://sedac.ciesin.columbia.edu/rs-treaties/rs_treaties.pdf) I quote here some of the relevant portions for land-cover change issues relevant to biodiversity and the Kyoto Protocol; Craig Dobson at NASA was instrumental in helping to develop this text:

“The group determined that there are several systems currently in place in either operational or experimental modes that could meet its data needs. First, there are coarse, moderate and fine resolution passive optical systems that are sensitive to surface chemistry (via pigmentation) and this data can be used to infer other surface conditions (i.e., land cover class). There are also experimental airborne LIDAR (Light Detection and Ranging) systems that can measure canopy height; the most advanced systems record the full wave return and can also provide information on surface height and the vertical distribution of vegetative material. In addition, there are microwave (radar) satellite systems that can measure moisture and structure (for above ground biomass). However, LIDAR and radar systems were not on satellites for the Kyoto baseline period of 1990. A number of satellite radar systems have been put into service by the international community (notably Japan, Europe and Canada) during the 1990s, though none of these are particularly well-suited for collecting data that can be used to estimate above-ground biomass on a global basis, nor have they been tasked to do so. Experts in the breakout session agreed that many practical obstacles exist to using these data tools to generate accurate estimates of above-ground carbon or even biomass stocks. These challenges include the potential cost of coordination, standardization and conversion of optical, radar and LIDAR data through common empirical models to yield the quantities of interest... Finally, in most cases, remote sensing does not provide a single source solution to information needs; rather it serves to extend an ongoing and healthy program of in situ observations. Within this context, the promise of remote sensing is to allow the development of more robust and efficient ground sampling strategies and to subsequently extrapolate from such in situ measurements in both space and time...

“Land cover comes up repeatedly as a data requirement, not just for the Kyoto Protocol, but for a host of other MEAs.... In the future, it is possible to envisage a suite of tools that could support MEAs such as Kyoto. The RS component would include a constellation of optical, LIDAR and radar instruments, flying roughly in formation, that would collect data simultaneously over the same land areas. These would need to be operational, with a commitment to long-term data provision. These would be linked, in turn, with in situ observations (for ground-truthing), improved estimates of biomass stocks, and to models that would integrate the RS data and provide some predictive capacity regarding future land-use changes and their relationship to emissions and concentrations of GHGs.”

At a personal level, I've followed the quest for a tool that could help to assess species richness and other metrics of conservation value over broad swaths. So far I have been disappointed by the results, and this holy grail may never be achieved. Yet it would seem at least theoretically possible to identify areas of say 10-100 sq.km with high likelihoods of having remaining habitats of high conservation value by combining sufficient layers of data in addition to remote-sensing derived metrics. In situ data collection could then take place in those regions.

It would also be tremendously useful to have global land cover data sets produced using the same/similar source sensor data and same algorithms to generate consistent land cover time series. This would be particularly important for habitat loss from deforestation. From what I understand, even MODIS VCF cannot be used to monitor deforestation trends.

Finally, in terms of in situ monitoring, it may be worth looking at what an army of volunteers aimed with GPS's could do in terms of data collection. There is a pilot effort under way in Africa called MAPA that may provide some lessons about how this might be achieved (see <http://www.mapaproject.org/>).

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

Our primary data products are in the socioeconomic realm, including data on the global distribution of population and poverty. We and other researchers have used these data for a variety of analyses, including in conjunction with remotely sensed data products, to assess drivers, threats, and opportunities for biodiversity conservation. These are freely available and CIESIN/SEDAC would be happy to facilitate the incorporation of the data in a biodiversity observation network. More information can be found at the following three web sites, and selected current and forthcoming products are detailed below:

- CIESIN: <http://www.ciesin.columbia.edu>
- SEDAC: <http://sedac.ciesin.columbia.edu>
- World Data Center on Human Interactions in the Environment (WDC): <http://sedac.ciesin.columbia.edu/wdc/>

SEDAC has recently gridded at 1-km resolution the entire Nature Serve collection of species distribution maps (mammals and birds for the Americas, and amphibians for globally). We plan to distribute those Spring of 2008. These will also be freely available for researchers wishing to integrate these data with other data sets.

We will be developing spatial portrayals of treaty status information. Thus, a researcher would be able to tell by a few clicks on a map if the country of interest is party to treaties of relevance to the protection of a given species.

We have a "portal" on Remote Sensing Applications in Support of Environmental Treaties that includes links to major initiatives and a number of downloadable documents.

We have a Thematic Guide to Global Land Cover Data that is nearly complete. Similar Thematic Guides have addressed issues such as land cover change. This guide could be of use to the biodiversity conservation community.



We are also coordinating a CODATA working group on the development of a global roads database that will help to assess the current road network, eventually down to the logging road level, and with any luck, where future roads are planned. This is of particular interest to our conservation NGO partners.

SEDAC has various indicator datasets, including the Human Footprint, Last of the Wild, and Human Appropriation of NPP, that provide ways of communicating complex data to applied users and decision makers. Also we do provide a population projection and scenarios of future development that could be useful for looking at future impacts.

Finally, SEDAC's open mapping services and planned Web Processing Services, are currently being developed in coordination with the GEOSS Architecture Implementation Pilot (AIP).

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

CIESIN is broadly interested in global spatial data sets. A comprehensive view of global biodiversity information would help in a number of our analyses, ranging from the outbreak of emerging infectious diseases (including zoonotics), human impacts of biodiversity, and poverty and conservation.

Respondent 19

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

- An important information requirement within South Africa is the amount of remaining natural asset and its condition, what it still contains (defined at different levels), and what directional trend this is showing especially in regard of trend toward extirpation at landscape or regional scale.
- Additional context would be trend toward global extinction for species or elimination for other elements. Importantly, identifying the reasons responsible for such changes which would require detailed info on relevant drivers of change.
- Data available on-line, and spatially explicit (an “atlas of biodiversity”). This would allow one to search any region of the world, and derive a species list for any sites where data has been collected. Good metadata on sampling procedures would be vital, as would be database management tools, robust data sharing protocols, tools for easily producing products from remote sensed documents, and support with developing the capacity to manage these in country.
- Regular reports or publications that one could use as a reputable citation when referring to the diversity of a particular location.
- Time series analyses indicating changes in diversity over time, for sites where adequate data exists.
- Standard methods for sampling diversity and analysis both spatial and temporal patterns in diversity.
- Fine scale climate prediction models with tools to test them against actual data
- Fine scale soil moisture prediction models to link to evapotranspiration rates under elevated CO₂ and different climate scenarios
- Remote sensing products of year round soil moisture, photosynthetic rates (NDVIs or equivalents), fire intensity and duration
- Rates of land transformation by urbanisation, agriculture/forestry and invasive plant infestations
- Air quality (NO_x), extent and concentrations

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

- SAEON has developed a collaborative GIS which is designed to store, search and retrieve data as well as provide metadata management according to recognized ecological metadata standards. The spatial component of the the COGIS is also designed to integrate data across format, scales and resolutions so long as this data is based on Open GIS Consortium standards. The entire system is largely open source based and the principles conform to that of the GEOSS data architecture.
- SAEON should, with time, be able to deliver processed products about the relative influence of CO₂ fertilisation, climate change, land use transformation, land and sea management, nutrient loading, pests and diseases, alien invasive organisms, pollution, altered disturbance regimes, and rare events on biodiversity defined in some hierarchical fashion (biomes, ecosystems, communities, species mainly). These products should reflect appropriate elements or groups for indicating biodiversity for each of the main biomes and ecoregions of the South Africa.
- For South Africa, data on biodiversity and biodiversity changes for various sites. Analyses would include analysis of existing biodiversity long-term data sets (although these are not common).

- Networking in Southern Africa.
- Our own users would (potentially) include post-grad students who require baseline diversity data for their research sites, as well as local and provincial government departments wanting information on the state of the environment in their regions
- Catchment runoff and climate data for small primary catchments streams for periods up to 70 years

3) *Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?*

- It is not so much global changes that are of interest but changes of countries that share the same elements of biodiversity (at whatever level). One would expect the greatest need of information from immediate neighbours to be of most use, the value of info from other countries thus decreases with distance from South Africa in most cases. In special cases such as species migration to distant countries one would want both taxon-specific and country-specific information.
- Another value of a global effort would be identification of influences and threats that may not have been considered in the SA context but which are relevant.
- Helps to fulfil South Africa's obligations under GEO.
- Marketing of local research opportunities.
- Provide a natural extension of our organisation which is a country wide biodiversity observation network.
- Provide access to data collected at an international level, e.g. remote sensed data.

4) *Please feel free to add any further comments or thoughts you would like to make.*

One would hope that a biodiversity observation system would concentrate on biodiversity per se and be cautious of the extent and manner to which concepts of the relation of biodiversity with ecosystem functioning become part of the Terms of Reference – it may serve to dilute rather than enhance output. The core of the matter is that we need to know what we have got and where it is, and what is happening to it and why.

Respondent 20

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

Compiled seasonal or annual vegetation indices – these are currently available but require substantial processing and time. More user-friendly, processed radar imagery would be useful to study important areas of deforestation in tropical, cloudy areas.

Consistent, updated land cover is crucial to most of our analyses, but there are no standard accurate products that consistently cover our priority ecoregions. Higher resolution imagery such as ASTER, which is still continuously collecting would be essential to updating our databases on new infrastructure (we currently use Terralook, which is ok, but not as good as the original data).

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

WWF-US has extensive wildlife (wildfinder) and other data (Landsat, field data) for our priority places, which cover about 10% of the earth's surface and are in very important biodiversity areas. We have medium and high satellite imagery for specific priority.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

This type of data would help substantiate some of the large scale effects of global warming that are apparent in our priority places, and we are always interested in mapping the drastic anthropogenic effects of new infrastructure on important wildlife areas.

Respondent 21

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

Main habitats/biomes and changes in these. Most other biodiversity indicators related to forests are difficult to obtain through remote sensing/global observation systems.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

FAO has been asked by the CBD Secretariat to provide the forest-related information for the assessment of progress towards the 2010 Biodiversity Target as part of the Global Forest Resources Assessment 2010 and is a member of the Biodiversity Indicator Partnership.

As regards forests and global observation systems, we will be able to provide data and analysis on:

The extent of forests and other wooded land by country, region, biome/ecological zone and at global level - and changes over time. While countries are asked to provide the information at national level, we are implementing a global remote sensing survey of forests for the period 1975-2005 which will provide information at regional biome/ecological zone and global level and will be able to also provide this information in the future. This is also part of GEO Task AG-06-04.

We are also producing a global mangrove layer for the next World Atlas on Mangroves.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

Information on main habitats/biomes other than forests.

Respondent 22

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

Ease-of-use is critical. There are loads of data, and loads of tools, but it is not generally easy to get answers to even simple questions. Questions like: How is my area of interest changing? What are the implications for it of climate change? What responses are most appropriate to these threats?

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

TerraLook, which provides recent and historical satellite images in easy-to-use JPEG formats covering all of Earth. Georeferencing means they can be combined with overlays for display. And, while not required (because users are free to use whatever software they want) there is also a nice tool to display and work with the images—essentially a simplified GIS/Image processing package. It is free and Open Source.

Examples of Use:

- Used by PA managers to map the extent of agricultural encroachment into their PA.
- Used by conservation managers to visually communicate change to people who can do something about it.
- Used by PA managers to map fire extent, management units, check boundaries, etc.
- Used by conservation planners to understand how an area is changing, as well as to understand what it looks like.
- Used as a base map by all kinds of users.
- Used by scientists for planning field work.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

It would be a great way to connect more users to the vast stores of NASA data so they can do good things with it. This provides societal benefits and makes those data more valuable.

Respondent 23

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

In recent years, global warming becomes hot issue for every country. It will cause consequence effects on species distribution and species extinction at global, regional and local levels. Right now, the predicted global climate data (2050 or 2100) is available at several sources but high resolution of climate data (1 km) and species distribution are limited or available in a few places. In my perspective, this data is very high demand.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

I am a country representative of International Long-term Ecological Research Network (ILTER) in Thailand. We do have detailed plant inventory data from 4-ha plot and long-term climate data located in the Sakaerat Biosphere Reserve in northern Thailand. At national scale, I have land use/land cover dataset, protected area coverage, and other GIS database. Currently, my Department and the Department of National Park, Wildlife and Plant conservation are implementing a research project on the impacts of land use/landscape and climate change on species distribution (selected plant and animal) in northern Thailand. We employ CLUE-S (Conversion of Land Use and its Effects at Small regional extent – developed by Wageningen University), GLOBIO 3 (Global Biodiversity Model – developed by the Netherlands Environmental Assessment Agency) and MAXENT (Maximum Entropy modelling of species distribution – developed by Steven J. Phillips, Robert P. Anderson, Robert E. Schapire). I can share experience with network members.

3) *Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?*

The Global Biodiversity Observation Network could strengthen my capacity and my organization as follows:

1. Broader the scope of research extent and theme: I and my Department would like to extend our research experience from national scale to regional scale, especially the Greater Mekong Sub-region (GMS). However, we have limited data to support our ambition. Right now, we have MOU with strategic partners in this region. We ensure that the global biodiversity observation network will strengthen our capacity and networking in the GMS.

2. Center for Regional Biodiversity Training: The Faculty of Forestry, Kasetsart University (KUFF) was established 72 years ago. The KUFF offers disciplinary formal and informal training related to biological resources and environmental management (BSc, MSc, PhD and certificate training). It has been recognized as regional academic center in SE Asia. There are many internal students and participants attending non-degree and degree trainings. By joining the global biodiversity observation network, we and our students are able to access regional and global dataset and it certainly will enhance their capacity in biodiversity assessment at broader scale. In addition, we are able to compare the research results or conduct comparative studies with other network members in different parts of the globe.

4) *Please feel free to add any further comments or thoughts you would like to make.*

I am very enthusiastic to attend the meeting and share my professional experiences with scientists around the world to safeguard biodiversity. In addition, I ensure that the global experience and network could reduce threats on biodiversity and strengthen Thailand's capacity in biodiversity management and planning.

Respondent 24

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

As a user, the future global diversity observation network should:

- Provide detailed and regularly updated thematic maps on vegetation cover, soils, at good scale of 1:100 000 or 1:200 000.
- Provide regional database that will be shared by all institutions within Africa : Data sharing mechanisms through online resources such as clearing houses or websites, guide books. Also it is important that the existing traditional knowledge be documented and incorporated in the regional database.
- Set up and or strengthen the use of geographical information system (GIS) for environmental analysis through spatial modeling of Biophysical and socio-economic parameters to develop indicators for long term monitoring of biodiversity.
- Build the capacity building through workshops and short training courses to disseminate information and the updated data, emerging technologies and opportunities that can be maximized to foster sustainable conservation of biodiversity.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

The Sahara and Sahel observatory (OSS) has labelled 25 local observatories in countries within circum-Saharan Africa, among which 12 are operational. These local observation networks are aimed at providing relevant data and sound decision-making tools at national levels.

Through the ROSELT/OSS the following have been achieved:

- Validated methodological guides for gathering data at local levels.
- Information charters have been developed at national or country level to organise the network through institutional collaboration.
- Data sets over time have been collected and used to prepare progress and annual reports on the local observatories, and also through participatory workshops, indicators have been elaborated for sub-regional and regional synthesis.

The data available are not limited to but includes:

- Human population (annual population growth rate, agricultural activities rate, schooling rate, global activities rate and household income)
- Socio-spatial organisation (Organisation / habitat density, total agricultural land area per inhabitant and/or number of fields per farm (and approximate size of field).
- Activity: Working population in agriculture, breakdown of main and secondary activities, home consumption rate for farm products, relation between family and external (Man hours) and herd structure and composition.
- Use of resources: stocking rate (number, duration, space), Offtake/fodder resources (% , FU), herd/flock growth rate, livestock production extension rate and timber offtake for firewood.
- Vegetation parameters (herbage production, composition, woody plants abundance, structure, density and dynamics).



Presently, the ROSELT/OSS have started integrating spatial monitoring within the local environmental observations.

How out data Data users:

- The countries have used the ROSELT/OSS data and findings from the local observatories environmental monitoring to write national reports to the United Nations Convention on Desertification (UNCCD)) Conference of Parties (COP).
- The achievements in the in the environmental monitoring is being capitalised through Dispositif Nationale de Surveillance Environnementales (DNSE) that will constitute the first component of Dispositif d'Observation et de Suivi Environnemental (DOSE) together with two other components; early warning systems and monitoring and evaluation. Currently countries are elaborating their DOSE and OSS is facilitating the process through training of the involved national institutions. Similarly on the future prospects, the elaborated specific national DOSEs will be a basis for elaborating sub-regional and regional DOSE.
- The data from the ROSELT/OSS local observatories are facilitating and enhancing the concretization of the synergy among the three multilateral environmental agreements.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

- Build scientific networks on environmental issues within the region and provide a platform for sharing of information and ideas among all actors; this will facilitate capacity building through exchange of information and ideas.
- Develop harmonised tools and methodologies for monitoring biodiversity by developing same a shared vision, same objectives and goals that will foster further partnership in the management of transboundary resources such as wildlife among others.
- Make the bridges between local observations and other levels such as the Global Monitoring for Environment and Security (GMES) and other environmental monitoring that have already integrated the remote sensing data.

Respondent 25

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

- Contar con datos satelitales para poder actualizar la cobertura boscosa y uso del suelo del país en periodos más cortos (4 años)
- Tener acceso a imágenes satelitales de alta resolución con el propósito de monitorear las deforestaciones que se están dando en nuestros bosques y no se pueden apreciar con imágenes Landsat o de resoluciones similares.
- Contar con modelos que nos permitan obtener productos que requieren de un análisis multivariables como el mapa de vegetación y mapa de ecosistemas.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

- Cobertura y Uso de Suelo Años 1990, 2000
- Vegetación 2000
- Imágenes Satelitales (1987-1990)(1998-2001)
- Modelo Digital de Elevación 90 metros

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

Contar con un monitoreo eficiente de satélites en nuestra región, ya que por la permanente cobertura de nubes, por vivir en un país húmedo tropical, es difícil conseguir imágenes de calidad.

4) Please feel free to add any further comments or thoughts you would like to make.

- Para nuestra institución es muy importante tener un monitoreo permanente y contar con mecanismos de monitoreo anual de la cobertura boscosa y uso del suelo, utilizando la herramienta SIG y los sensores, para poder tener información continua sobre la biodiversidad, y cumplir con nuestra visión de lograr un manejo sostenible de los recursos naturales y la protección de las áreas de reservas.
- También necesitamos incrementar la eficacia del ordenamiento digital de toda la información forestal existente con miras al mejoramiento a la conservación, manejo y aprovechamiento de los recursos forestales en Panamá.

Respondent 26

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

- Data products: Free access for optical and radar satellite data with high-moderate resolution.
- Analyses or tools: Free software for analysis of biodiversity's indicators.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

- Research work: To join cooperative research programs in field biodiversity conservation
- Training programs: To set up appropriate training program in field of Geoinformatics to support GEO BON.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

- Data Products: To share data products for supporting GEO BON.
- Analyses or tools: To have a standard tools for biodiversity conservation.

Respondent 27

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

We expect from a GEO BON a community agreeing on common issues to be addressed, that will follow shared data standards and monitoring protocols, aimed towards assessing global biodiversity and environmental trends. In order to achieve this goal, the trends and their causes must be identified. Questions such as the causes of these changes and consequences must be analysed with effective tools. The data needed to answer these questions are essential in the assessment process.

Current land use change, pollution, unsustainable extraction, species invasions, climate change, are affecting biodiversity at unprecedented rates, and its monitoring must be addressed promptly in verifiable and predictable ways. Experiments that control variables and identify individual causes and consequences would be required.

In extreme environmental conditions such as those found in high-latitude regions, coral reefs, oasis and high mountains, we find undergoing natural experiments with highly particular biota which can shed light on evolutionary responses to habitat change. Within these ecosystems variables may be more easily isolated, such that specific causes can be identified and responses to each can be addressed. Global biodiversity and environmental data for these particular environments can be gathered in standardized formats.

Páramos are high mountain ecosystems in the Neotropics with extreme environmental conditions that have driven in recent geological time exemplar evolutionary processes resulting in a unique biota. Páramos represent a model system where biodiversity and environmental changes may be monitored in a plausible way. Páramos will provide a model to apply tools on standardised data in order to identify biodiversity trends, their causes and consequences, thus permitting predictable scenarios that may be controllable. The system may be scalable to comparable habitats in European, African, Southeast Asian mountain regions.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

We are developing a biodiversity information system for páramo biota, consisting of:

- A phylogenetically structured georeferenced database of páramo biological collections following GEO BON agreed standards
- Characterization of the páramo ecosystem at geophysical, environmental, cultural and political-geographical levels from a multilayer geographical information system
- Biodiversity indices of spatial and temporal distribution of páramo species coupled with environmental correlates and evolutionary processes
- Causal explanations and predictive models on the effects of past and future environmental changes on biodiversity



3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

A global biodiversity observation network will provide the required perspective to localized monitoring systems, promoting the development and use of data gathering standards for exchange and integration. Communication with other such monitoring systems distributed globally will also enhance reciprocity and feedback on the development of data analysis processes and shared analytical tools, identification of common problems and proposed solutions that will enhance the success of GEO BON goals, through the scaling of local model systems to a global scenario.



Respondent 28

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

Discovery and access services to global biodiversity datasets.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

Interoperability infrastructure components to implement: multi-disciplinary resources discovery and access, model runs (e.g. ENM, climate change).

This framework has been developed and tested in the GEOSS IP3 (Interoperability Process Pilot Project) framework in collaboration with GBIF and WMO (Siri Jodha Khalsa, Stefano Nativi, Eamonn O Tuama, David Thomas). This is going to be the first testbed for the Model Web concept proposed by NASA JPL (Gary Geller).

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

It would implement a critical spatial information infrastructure to be interoperable with.

Respondent 29

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

In the framework of Earth Observations (the focus of GEO), and in line with the proposals of the 10-Year Plan Reference Document for GEOSS, in terms of an overall Biodiversity Observation Network (BON), we envision a tiered system which would consist of in-situ sensors for the monitoring of biodiversity (at species and ecosystem levels) as well as relying on satellite-based observations and proxy data.

With regard to specific data products, in the short term, demand for proxy biodiversity products (e.g. NDVI, GPP, FPAR, etc.) will likely continue. Additionally, however, future products might include more direct or possibly modelled measures of:

- Vegetation diversity
- Aquatic biodiversity
- Marine biodiversity (especially in coral reefs)
- Species richness (number of unique species in an area)
- Species density
- Species observations / locations (e.g. near-real time data provided through telemetric means)

Additionally, emphasis on the interoperability of data products will also have will also be important. This will include standardization of the definitions of the data being used (e.g. estimates of gross primary productivity in metric as well as non-metric systems to suit user needs).

Analyses:

- Coupling satellite imagery with ecosystem maps to develop an index of vegetation or tree diversity;
- Developing an expression of land use change in units of biodiversity loss
- comparative analyses of pre- and post- natural disaster in over a number of weeks, months, and years (depending on the event), to visualize dynamics of spatial reconstruction of biodiversity after a catastrophe

Tools:

- An application or extension that delineates potential habitats for a species given environmental input variables such as ranges of temperature, precipitation & elevation, land cover type, and maybe even distribution of other species that it relies upon (e.g., lynx relies upon hare, flying fox relies upon durian)
- Web mapping applications that allow users to visualize, query and analyze data without needing access to expensive software packages
- But for those who want the raw stuff, a means for distributing georeferenced data compatible with multiple platforms

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

Overall, through SERVIR, and with regard to biodiversity, we process a number of products derived from NASA satellites for use by environmental managers and decision-makers in Mesoamerica. For instance, in association with NASA's Terrestrial Observation & Prediction System, we provide scientists and environmental managers in the region with access to a number of MODIS-based products such as NDVI, EVI, LAI, GPP, FPAR. In association with the University of Maryland's FIRMS and NOAA's Hazard Mapping System, we work to provide park managers with information on hotspot detections.

- Metadata portal in which one can search by keywords and geographic extent
 - o Currently in Mesoamerica & Caribbean
 - o Plans to extend to Africa
- Online map-makers / visualizations
- 3d visualizations (similar to Google Earth), in which georeferenced biodiversity data could be overlain with other environmental layers (e.g., current weather conditions & forecasts, regional climate change scenario, volcanoes, earthquakes, NDVI, red tide, and more...

Additional to the standard data products we provide access to through our online infrastructure, with our collaborators we have also conducted a variety of specialized assessments. These include, for instance, spatial analyses of NatureServe's InfoNatura species habitat maps (mammals, birds, amphibians) to assess species richness for Mesoamerica and the Caribbean. Additionally, we have been conducting an assessment of the potential impacts of climate change on biodiversity within the current / proposed protected areas of the globally-significant Mesoamerican Biological Corridor.

As alluded to, in terms of user base for SERVIR, currently our main users are the Ministries of the Environment of the nine (9) countries within Mesoamerica and the Dominican Republic who utilize information provided through SERVIR to understand what is occurring in the environment on a daily and weekly basis.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

- Measures of biodiversity are always valuable components in environmental impact assessments (EIA) and conservation efforts
- Developing plans for biological corridors

4) Please feel free to add any further comments or thoughts you would like to make.

Developing a network, knowledge base, or knowledge portal of all species tracked with radar collars or otherwise monitored for movement could be a good way to share information on species migration. This might be particularly useful for studying species' reactions to changing climate and land cover

Respondent 30

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

- Improved data on the spatial distribution and density of development – worldwide. This includes the sparse development outside of traditional urban zones. The ideal data source would be moderate resolution (30-100 meter resolution) multispectral low light imaging data acquired at night.
- Measurements of annual growth in development, including growth in sparse development.
- Improved mapping and monitoring of ocean ecosystems, both benthic and pelagic. The Census of Marine Life (<http://www.comlsecretariat.org/>) has embarked on such a program.
- Improved measurement and reporting of human activity on and in the oceans. Illegal, unreported, and unregulated (IUU) fishing is likely about 20-40% of the globally reported catch. How much fishing happens, and where, would be of immense use. Marine Protected Areas (MPAs) are increasing in their legal force, their number, and popularity. Having knowledge of IUU activities in MPAs or proposed sanctuaries would be useful.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

At NGDC we produce coarse resolution (1 km+) global nighttime lights products using data from the U.S. Air Force Defence Meteorological Satellite Program (DMSP) Operational Linescan System (OLS). The data are used to track heavily lit fishing boat activity (e.g. in East Asia). We have used the data to generate a global density grid for constructed surfaces (see http://www.ngdc.noaa.gov/dmsp/download_global_isa.html), a global poverty map (see http://www.ngdc.noaa.gov/dmsp/download_poverty.html), a global map of oil field gas flaring (see http://www.ngdc.noaa.gov/dmsp/interest/gas_flares.html), and a global assessment of the proximity of development to coral reefs (http://www.ngdc.noaa.gov/dmsp/download_coral_reefs.html).

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

NOAA is the primary US agency with responsibility for marine fisheries, aquaculture, and marine ecosystems. NOAA manages thirteen national marine sanctuaries and one marine national monument (see <http://sanctuaries.noaa.gov/welcome.html>). NOAA is part of the U.S. Department of Commerce which includes the Census Bureau, Economics and Statistics Administration, and the Bureau of Economic Analysis. Over time, the DOC may become more involved in analyzing the economic value of biodiversity and ecological services.

4) Please feel free to add any further comments or thoughts you would like to make.

I would like to see a set of alert systems established to identify the onset of severe ecological consequences of human activity. One example would be the detection and reporting of biological changes associated with ocean acidification, which is expected to adversely affect the ability of organisms to precipitate calcite and aragonite.



Respondent 31

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

An enhanced version of Conservation GeoPortal (www.conservationmaps.org) – with Shared geoprocessing (analytical workflows) and statistical/scientific models

- Data models
- Best practices
- Downloadable data
- Ideally data provided as webservice
- Geo-wiki
- Unstructured data – documents, journal articles, briefings, video, ppts, etc.

Conservation Data Models for more structured databases and data interoperability, etc.

Conservation Semantic Ontologies

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

ESRI's GIS Portal Toolkit- via the GEO portal candidate (<http://keel.esri.com/Portal>).

ArcGIS Online (<http://arcgisonline.esri.com>) – currently content – which is undergoing enhancement. We welcome your requirements/suggestions to what you would like to see here as base data.

Planet Action (www.planet-action.org) imagery from SPOT Image.

Free GIS tools such as:

- ArcGIS Explorer (3D): <http://www.esri.com/software/arcgis/explorer/index.html> and <http://resources.esri.com/arcgisexplorer/> - which consumes a large number of formats including KML, shapefiles, geodatabases, and MANY imagery formats, etc.
- ArcReader (2D): <http://www.esri.com/software/arcgis/arcreader/about/features.html>

Connectivity and exposure to a large network of environmental management, land use planning, conservation, and other GIS users in over 150+ countries around the globe, and industry groups such as the Petroleum User Group (PUG - www.esri.com/events/pug/).

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

This supports ESRI's vision and the needs of many of our users who are engaged with and/or care deeply about biodiversity.



4) Please feel free to add any further comments or thoughts you would like to make.

We wish to engage further with you on this topic and look forward to the next opportunity.

Related websites:

www.conservationgis.org

www.scgis.org

www.conservationmaps.org

www.conserveonline.org

www.planet-action.org

www.globio.org

www.worldwildlife.org/wildfinder/

www.natureserve.org/infonatura/

www.natureserve.org/explorer/

Respondent 32

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

Species distribution maps that are accurate enough to use at the national scale for planning purposes; ecosystem maps that recognise ecosystem heterogeneity at national, rather than regional or global scale, and thus, are useful for planning purposes at the national level; standard methodologies for data gathering; standard procedures for monitoring biodiversity status, changes and trends at the national level; a better understanding of the relationship between local biodiversity/ecosystem and the services they provide to the local populations.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?.

Local validation of global maps and databases; reports of the status and trends of the biodiversity that is being monitored (with methods, indicators and procedures that are globally coherent and consistent); early-warning (it is actually national governments and organizations which should act as sentinels of the share of the global biodiversity that lies within their countries' boundaries).

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

In Uruguay we are in need of that information (distribution maps and ecosystem classifications) for planning our national system of protected areas; we are also in need of standard, reliable but cheap procedures to monitor the status and impact of human activities on our biodiversity/ecosystems, as well as procedures to track the advances of the national system of protected areas towards its conservation goals; the existence of a direct link between national conservation actions and global conservation efforts give national conservation actions a strong support, thus, making it more likely that other sectors of the government will be ready to accept them despite of potential conflicts with other interests.

4) Please feel free to add any further comments or thoughts you would like to make.

For GEO – BON to provide useful information for national governments and organizations there is a need to make important efforts to assure that top-down analyses as those based on satellite data are actually validated at the local level, and that such information is then used to improve the global/regional classification/map/database. I've used several global/regional scale datasets and always find it frustrating how inaccurate they might be with respect to the information that can be obtained locally. For example:

- I've used NatureServe's Mammals of the Western Hemisphere distribution maps to analyse the distribution of Carnivores' phylogenetic diversity in the Americas (Soutullo, A., S. Dodsworth, S. B. Heard & A. O. Mooers. 2005. Distribution and correlates of Carnivore phylogenetic diversity across the Americas. *Animal Conservation* 8(3): 249-258). Yet, given the relatively inaccuracy of the maps when I tried to study the patterns of range collapse of endangered South American mammals they did not properly reflect distribution information that we had, preventing us from continuing those analyses. The same applies when planning our national system of protected areas: not all the mammal species found in Uruguay have distribution maps that reach the country, some other species not still found here do have maps that include Uruguay, and for many of the species found in Uruguay the maps do not reflect the known distribution in the country.
- I've also used the European Corine Land Cover map to analyse habitat use of Golden eagles tracked by satellite telemetry in Spain (Soutullo, A., V. Urios, M. Ferrer & P. López-López. 2008. Habitat use by juvenile golden eagles in Spain. *Bird Study*: in press.). The existence of such a map was valuable as given the nation-wide scale of the movements undertaken by golden eagles during their first years of life we needed a map that covered the whole Iberian Peninsula. Yet, while the accuracy of the locations we could obtain for some individuals had <10 m error, the coarse classification and the size of the habitat polygons of the Corine map did not reflect the habitat variability of the few places we could actually visit, preventing us from performing detailed habitat analyses, despite of the accuracy with which we knew the position where birds had been located.
- For planning our national system of protected areas, neither the Global Land Cover map, nor NatureServe's South American ecosystems classification are detailed enough to capture the heterogeneity of ecosystems of our country (which is not particularly diverse: 70% prairies and grasslands), which is forcing us to build our own ecosystems map. This is scheduled to be done in 2009. It might be a good time to explore how to translate/validate the top-down approach of NatureServe's South American ecosystems classification into classifications that area also useful for planning at the national level.
- Finally, I've worked with the World Database on Protected Areas (WDPA) for two different studies. In one, based on the ecoregional coverage of protected areas in Argentina, Brazil, Bolivia, Chile, Paraguay and Uruguay we complemented the data provided by the WDPA with information on protected areas obtained directly from national agencies and NGOs (Soutullo, A. & E. Gudynas. 2006. How effective is the MERCOSUR's network of protected areas in representing South America's ecoregions?. *Oryx* 40(1): 112-116). There were important differences between our database and the WDPA. We got polygons for many areas for which the WDPA only provided point data, areas not listed in the WDPA, and found that many areas had been assigned an incorrect IUCN category. Yet, there was not a simple mechanism we could use to provide that information to the WDPA, in order to improve its accuracy. In the latest analysis we assigned every protected area in the WDPA to one or more terrestrial ecoregions (Soutullo, A., M. De Castro & V. Urios. 2008. Linking political and scientifically-derived targets for global biodiversity conservation: implications for the expansion of the global network of protected areas. *Diversity & Distributions* 14: in press). Yet, there are not simple mechanisms to send those data to the WDPA administrators in order to include them in coming version of the database.

What I want to point out is that there is a need to develop mechanism by which the kind of "fine-tuned" information that can be obtained at the local level can be incorporated into global datasets to improve these datasets accuracy, and thus, their usefulness not only for global-scale analyses, but also for more detailed national-scale ones.



Respondent 33

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

IOC/GOOS would be a partner in GEO-BON, not a user.

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

Although GOOS' most visible efforts to date have tended to be related to physical monitoring - for example of sea level rise and temperature change in the oceans, we do have some substantial ongoing efforts relevant to biodiversity that are ramping up. These include ocean color measurements from space for global ecosystem indicators, with in complementary standardized in situ measurements required for taxonomic information (eg www.chorlogin.org, www.antaes.ws), fish and mammal tagging tagging and tracking with acoustic curtains on coastal shelves (Ocean Tracking Network, www.oceantrackingnetwork.org), many decades of continuous plankton recorder timeseries lines (www.sahfos.ac.uk) and of course research and assessment efforts under the auspices of programs such as the Census of Marine Life and the GEF large marine ecosystems work, GEF Transboundary Waters Assessment Programme (TWP) and UN State of the Marine Environment Assessment. IOC is currently actively engaged in bringing some of these diverse efforts together in an attempt to define the sustained biological component of the Global Ocean Observing System in the hope of improving our provision of societal benefits and providing a marine contribution to GEO-BON.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

GOOS would benefit from a focused effort to develop sustained biological monitoring as part of its remit.

Respondent 34

1) Thinking broadly, what are some of the possible data products, analyses or tools that you would want as a user of a future global biodiversity observation network?

As an end-user on emerging infectious disease detection and response, U.S. EPA would like to use time-series, representative data on biodiversity trends of animal hosts and vectors involved in important zoonotic disease life cycles (e.g. Lyme disease, West Nile virus, malaria, encephalitis). These need to be collected regularly, using standard, comparable methods. (Most of the emerging and re-emerging diseases of the last 50 years have originated in animals)

2) What are some of the data products, analyses or other tools that you or your organization might be able to provide in support of a global biodiversity observation network (even if your data products and analyses are not global, but , for example, regional in scope, or otherwise restricted in scope)? Could you please provide some examples of your own users and how they use your products?

At U.S. EPA, we developed a new interdisciplinary research initiative to study the scientific relationships linking anthropogenic stressors, changes in biodiversity, and disease transmission to humans. This program is unique in its interdisciplinary approach that also involves end users (e.g. decisionmakers) in the research design/execution process. It also encourages the coordination of earth observations data with field data on biodiversity and health to help study these relationships. For example, EPA is sponsoring an EPA/Center for Disease Control (CDC)/Yale University/NASA Ames research project which:

Builds on an existing CDC-Yale spatial modeling project to test new hypotheses linking tick density and infection rates with new data on meteorology, mammalian, and bird diversity to answer:

- Does pathogen prevalence reveal spatial patterns that are dependent on climate and landscape characteristics?
- How does pathogen prevalence respond to changes in habitat structure, vertebrate communities, or other indicators of biodiversity?

Uses NASA Terrestrial Observation and Prediction System (TOPS) to provide daily information on climate and indicators of biodiversity

Will produce a surface map of human risk for infection from Lyme disease throughout the range of the primary vector, *Ixodes scapularis*, in the U.S.

TOPS delivers datasets from a variety of RS and in situ instruments, on a daily basis, describing land surface condition, including the NDVI, which measures vegetation density (which has been used to assess mammalian diversity in Kenya). We are exploring TOPS land surface condition variables and their relationship with the field measures of mammalian diversity to see if they are reasonable proxies of mammalian diversity. If so, the surface risk map can be continuously updated using these near real-time data. CDC and EPA are important partners to help ensure that research results are made relevant to decision makers in the interventions and preventative measures that are recommended to the public.

This effort will be augmented by another project that will associate wildlife host and pathogen diversity with human residential exposure, and validate risk models based on wildlife field samples by documenting human incidence rates and residential land-use patterns at the scale of U.S. Census tracts. Forest fragmentation disrupts natural disease regulation in native wildlife communities. This project will demonstrate potential associated human-health effects through model validation and scenario mapping.

Examples of users of the information and models are the local, state, and regional land use planners and managers. They will be able to compare alternative development scenarios in terms of potential changes in risk of exposure to wildlife-associated disease. Private and state health clinics will also be able to use these tools to help predict the number of new disease cases, and where these will occur.

3) Again thinking broadly, what value might a global biodiversity observation network add to your organization, e.g. how could it address your needs, how could it strengthen your position, etc.?

If the data described in #1 above are made easily available, we could use that data to:

- Help identify “hotspots” of biodiversity and emerging disease after matching up areas of accelerating biodiversity loss with areas of disease emergence. These would be sites for further investigation at the local level (if not already) where a causal link could be demonstrated and documented.
- Help to inform disease emergence and preparedness, particularly if these are areas with poor health infrastructure. Populations living in these areas might be considered “at risk” and “vulnerable” to emerging and re-emerging disease.